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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Jay K. Bass

Serial No.: 09/846,058

Examiner: Jon D. Epperson

Filing Date: April 30, 2001

Group Art Unit: 1639

Title: CHEMICAL ARRAYS WITH ORIENTED ROWS

COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on May 18, 2007

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)(1)-(5)) for the total number of months checked below:

<input type="checkbox"/>	one month	\$ 120.00
<input type="checkbox"/>	two months	\$ 450.00
<input type="checkbox"/>	three months	\$1020.00
<input type="checkbox"/>	four months	\$1590.00

☐ The extension fee has already been filled in this application.

☒ (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 50-1078 the sum of \$500.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account 50-1078 pursuant to 37 CFR 1.25.

A duplicate copy of this transmittal letter is enclosed.

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571-273-8300  
Date of Facsimile: June 15, 2007

Typed Name: Sandra D. Hunter

Signature: 

Respectfully submitted,

Jay K. Bass

By 

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<b>APPEAL BRIEF</b>  Address to: Mail Stop Appeal Brief-Patents Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Application Number	09/846,058
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	Filing Date	April 30, 2001
	First Named Inventor	Bass, Jay K.
	Examiner	Epperson, Jon D.
	Group Art	1639
Title: "CHEMICAL ARRAYS WITH ORIENTED ROWS"		

Sir:

This Brief is filed in support of the Applicants' appeal of the rejections set forth in the Office Action dated April 19, 2007. A Notice of Appeal was filed on May 18, 2007. As such this Appeal Brief is timely filed.

The Board of Patent Appeals and Interferences has jurisdiction over this appeal pursuant to 35 U.S.C. § 134(a).

The Commissioner is hereby authorized to charge deposit account number 50-1078, reference no. 10004190-1 to cover any fee required under 37 C.F.R. § 1.17(c) for filing the Applicants' brief. Additionally, in the event that the fee transmittal or other papers are separated from this document and/or other fees or relief are required, the Applicants petition for such relief, including extensions of time, and authorize the Commissioner to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 which may be required by this paper, or to credit any overpayment, to the above disclosed deposit account.

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**RECEIVED  
CENTRAL FAX CENTER****JUN 15 2007**Atty Dkt. No.: 10004190-1  
USSN: 09/846,058**REAL PARTY IN INTEREST**

The real party in interest in this appeal is Agilent Technologies, Inc.

**RELATED APPEALS AND INTERFERENCES**

There are currently no other appeals or interferences known to the Appellant, the undersigned Appellant's representative, or the assignee to whom the inventor assigned his rights in the instant case, which would directly affect or be directly affected by, or have a bearing on the Board's decision in the instant appeal.

**STATUS OF CLAIMS**

The present application was filed on April 30, 2001 with Claims 1 to 26. On July 15, 2003 a first substantive Office Action was issued. In the Applicants' response filed October 15, 2003 the Applicants amended Claims 1 and 4; and withdrew Claims 10-26. A second substantive Office Action issued on January 13, 2004. In the Applicants' response filed on April 13, 2004, the Applicants amended Claims 1, 4, 5 and 8; canceled claims 24-26; and added Claims 27-30. On April 26, 2004, the Applicants filed a Supplemental Amendment amending Claim 4; and adding Claims 31-38. A third substantive Office Action issued on July 13, 2004. On September 8, 2004 the Applicants responded by amending Claims 1, 4, 27, 28, 29, 35 and 37; canceling Claims 10-23; and adding Claims 39-46. In an Advisory Action dated October 19, 2004 the Applicants were notified that the proposed amendments were not entered. Consequently, the Applicants filed a Request for Continued Examination (RCE) on November 16, 2004. A fourth substantive Office Action issued on February 8, 2005. In the Applicants' response filed on April 22, 2005 the Applicants amended Claims 1, 4, 28, 45 and 46; and canceled Claim 27. A fifth substantive Office Action issued on July 11, 2005. On September 8, 2005 the Applicants responded by amending Claims 1, 4 and 46. In an Advisory Action dated October 6, 2005 the Applicants were notified that the proposed amendments were not entered. On November 7, 2005 the Applicants filed a Supplemental Response amending Claims 37 and 38; and canceling Claims 1-9, 30, 32-34, 36 and 46. A sixth substantive Office Action issued on December 29, 2005. In the Applicants' response filed March 27, 2006 the Applicants amended Claims 28 and 45. A

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seventh substantive Office Action issued on July 18, 2006. In the Applicants' response filed September 26, 2006 the Applicants amended Claims 28 and 45. An eighth substantive Office Action issued on January 5, 2007. The Applicants filed a response on March 1, 2007, but did not amend the Claims. In an Advisory Action dated April 19, 2007 the Applicants were notified that the request for reconsideration did not place the application in condition for allowance. Consequently, the Applicants filed a Notice of Appeal on May 18, 2007. As the claims have been twice rejected by the Office, the Applicants hereby Appeal the case to the Board of Patent Appeals and Interferences pursuant to 35 U.S.C. § 134(a).

#### **STATUS OF AMENDMENTS**

Subsequent to issuance of the final Office Action, no amendments to the claims were filed. As such, Claims 28, 29, 31, 35 and 37-45 are presently pending.

#### **SUMMARY OF CLAIMED SUBJECT MATTER**

Biopolymer arrays, such as arrays of peptides or polynucleotides (such as DNA or RNA) are fabricated by depositing droplets of biopolymers onto a substrate. Biopolymer arrays include regions (sometimes referenced as features or spots) of usually different sequence biopolymers arranged in a predetermined configuration on a substrate. However, the surface of a substrate on which the arrays are fabricated is not perfectly flat. The rejected claims relate to a method of fabricating biopolymer arrays which includes determining a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate surface. The chemical moieties are placed on the substrate so as to provide features thereon along rows more closely aligned with the first direction than the second direction.

Alignment of the array features according to the above method increases the accuracy of drop deposition onto the substrate surface by minimizing variations in height across the surface along the rows of the array features. This method also increases the accuracy of the detection of the array features as they are read by a scanner by making the optical path length to or from the array features more uniform along the rows of the array features.

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A description of each appealed claims follows below.

Independent Claim 28 recites a method of fabricating an array of multiple features of different chemical moieties on a surface of a substrate. (See page 3, lines 27-29). The method includes: (a) comparing height uniformity in a first direction and a second direction across a planar surface of a substrate to identify a first direction having higher substrate height uniformity than a second direction, wherein the first and second directions are planar to the substrate (See page 3, lines 29-31); and (b) employing a pulse jet printer to deposit different chemical moieties in rows on the planar surface of the substrate lengthwise along the direction having the higher height uniformity (See page 3, lines 31-33), wherein the rows each contain a plurality of spatially addressable features containing the different chemical moieties (See page 4, lines 1-5) and wherein the rows are more closely aligned with the first direction than the second direction, in order to fabricate an array of multiple features of different chemical moieties on a substrate surface (See page 4, lines 26-31).

Independent Claim 29 recites a method of fabricating an array of multiple features of different chemical moieties on a substrate surface. (See page 3, lines 27-29). The method includes: (a) receiving the substrate from a remote location (See page 4, lines 6-12); (b) receiving from a remote location an identification that indicates the direction in which the substrate was drawn (See page 4, lines 6-16); and (c) placing the different chemical moieties on the substrate so as to provide features thereon along rows aligned with said direction, in order to fabricate an array of multiple features of different chemical moieties on a substrate surface (See page 3, lines 31-33).

Claim 31 recites a method according to Claim 29, wherein the rows are parallel to the direction in which the substrate was drawn (See page 4, lines 26-29).

Claim 35 recites a method according to Claim 29, wherein the identification includes reference to a shape characteristic of the substrate or housing thereof (See page 4, lines 21-25).

Independent Claim 37 recites a method of fabricating an array of multiple features of different chemical moieties on a substrate surface. (See page 3, lines 27-29). The method includes: (a) receiving the substrate from a remote location (See page 4, lines 6-12); (b) receiving from a remote location, an identification of a

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first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate, wherein the first and second directions are planar to the substrate (See page 15, lines 3-17); (c) placing the different chemical moieties in rows on the substrate, wherein the rows each contain a plurality of different chemical moieties and wherein the rows are more closely aligned with the first direction than the second direction, in order to fabricate an array of multiple features of different chemical moieties on a substrate surface (See page 3, lines 27-33); wherein the identification is communicated from the remote location via electronic media (See page 10, line 32 to page 11, line 5).

Independent Claim 38 recites a method of fabricating an array of multiple features of different chemical moieties on a substrate surface. (See page 3, lines 27-29). The method includes: (a) receiving the substrate from a remote location (See page 4, lines 6-12); (b) receiving from a remote location, an identification of a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate, wherein the first and second directions are planar to the substrate (See page 15, lines 3-17); (c) placing the different chemical moieties in rows on the substrate, wherein the rows each contain a plurality of different chemical moieties and wherein the rows are more closely aligned with the first direction than the second direction, in order to fabricate an array of multiple features of different chemical moieties on a substrate surface (See page 3, lines 27-33); wherein the identification is communicated from a computer memory, in response to providing an identifier of the substrate (See page 4, lines 12-16).

Claim 39 recites a method according to Claim 29, wherein the identification is associated with the substrate or packaging thereof (See page 4, lines 12-14).

Claim 40 recites a method according to Claim 29, wherein the identification references a shape characteristic of the substrate or housing thereof (See page 4, lines 21-25).

Claim 41 recites a method according to Claim 29, wherein the identification is associated with the substrate via an identifier on the substrate, or housing thereof (See page 4, lines 19-21).

Claim 42 recites a method according to Claim 29, wherein the identification is

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communicated from the remote location (See page 4, lines 6-14).

Claim 43 recites a method according to Claim 42, wherein the identification is communicated via electronic media (See page 10, line 32 to page 11, line 5).

Claim 44 recites a method according to Claim 42, wherein the identification is communicated from a computer memory, in response to providing an identifier of the substrate (See page 4, lines 14-16).

Independent Claim 45 recites a method of fabricating an array of multiple features of different chemical moieties on a surface of a substrate. (See page 3, lines 27-29). The method includes: (a) comparing height uniformity in a first direction and a second direction across a planar surface of a substrate to identify a first direction having higher substrate height uniformity than a second direction, wherein the first and second directions are planar to the substrate (See page 3, lines 29-31); and (b) placing the different chemical moieties in a row on the planar surface of the substrate lengthwise along the direction having the higher height uniformity so as to provide a row of different chemical moieties that is more closely aligned with the first direction than the second direction (See page 3, lines 27-33), wherein the row contains a plurality of spatially addressable features containing the different chemical moieties, in order to fabricate an array of multiple features of different chemical moieties on a substrate surface (See page 9, line 31 to page 10, line 3).

**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

- I. The Appellants request review of the grounds for the rejection of Claims 28, 29, 31, 35, and 37-45 under 35 U.S.C. § 112, first paragraph as not satisfying the written description requirement.
- II. The Appellants request review of the grounds for the rejection of Claims 28, 29, 31, 35 and 37-45 under 35 U.S.C. § 112, first paragraph as not satisfying the enablement requirement.
- III. The Appellants request review of the grounds for the rejection of Claim 45 under 35 U.S.C. § 102(b) as being anticipated by Cremer et al. *J Am Chem Soc* 1999, 121:8130-31.



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- IV. The Appellants request review of the grounds for the rejection of Claims 28 and 45 under 35 U.S.C. § 103(a) as being obvious over Cremer, *supra*, in view of Lemmo et al. *Anal Chem* 1997, 69:543-51 and Baldeschwieler et al. (WO 95/25116).

#### **ARGUMENT**

- I. **Claims 28, 29, 31, 35, and 37-45 stand rejected under 35 U.S.C. § 112, first paragraph as not satisfying the written description requirement.**

This rejection is based on the Examiner's belief that the rejected claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In sum, the Examiner believes that the specification inadequately describes the claimed substrate and chemical moieties on the substrate.

The Appellants submit that this rejection is flawed for many reasons. Most notably, the Written Description Guidelines and current caselaw, using no uncertain terms, state that the specification of a patent application need only describe in detail that which is new or not conventional. The Appellants believe that this rejection is flawed because all of the elements to which the Examiner points to as being inadequately described are conventional and well known to one of ordinary skill in the art. As such, those elements need not be described in great detail.

Given the instant specification and what is already known about the chemical arrays and substrates, the Appellants submit that the claims of this case meet the written description requirement of 35 U.S.C. § 112, first paragraph, and this rejection should be withdrawn.

The Appellants submit that all rejection should be withdrawn on the basis of the above arguments which are presented in summary. To the extent that further discussion is deemed necessary, the Board is respectfully referred to the following.

Below are the contentions of the Appellants with respect to the multiplicity of arguments that the Examiner has advanced in support of this rejection. For

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purposes of clarity, the Appellants have responded to each argument advanced by the Examiner as indicated by the subheadings below.

A. "The claims encompass the use of virtually an infinite number of substrates."

The Examiner asserts that the rejected claims encompass the use of virtually an infinite number of substrates (See April 19, 2007 Advisory Action, page 2). The Examiner points to page 21, line 20 of Appellants' specification for a disclosure that "[t]he substrates may be fabricated from any of a variety of materials."

Claims 28 and 45 are directed to a method that includes a substrate that has a planar surface. As such, any substrate that does not have a planar surface is outside of the metes and bounds of Claims 28 and 45. Claim 29 is directed to a method that includes a substrate that has been drawn. As such, any substrate that has not been drawn is excluded from the metes and bounds of Claim 29. Claims 37 and 38 are drawn to a method that includes a substrate that inherently has a higher height uniformity along a first direction than a second direction. As such, any substrate that does not have a higher height uniformity along a first direction than a second direction is excluded from the metes and bounds of Claims 37 and 38.

In view of the above, the Appellants contend that this assertion of the Examiner is erroneous because the claimed substrates are in fact limited in various ways so as to exclude embodiments that would not be compatible with the claimed methods. Specifically, it is only those substrates that have a planar surface, have been drawn and/or have a higher height uniformity along a first direction than a second direction that are covered by the metes and bounds of the claims; all other substrates which do not meet these claim limitations are outside the scope of the claims. Additionally, the Appellants contend that one of skill in the art would readily understand, in view of the teachings of the specification, what is meant by a planar substrate (see FIG.1 and page 21, lines 5-11), a drawn substrate (see page 3, lines 16-26 and page 8, lines 16-20), and a substrate that has a higher height uniformity along a first direction than a second direction (see page 7, line 30 to page 8, line 7). Hence, contrary to the assertions of the Examiner, the rejected claims do not

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encompass virtually an infinite number of substrates, and the Appellants contend that one of skill would understand this and not doubt that the Appellants had possession of the claimed invention at the time of filing the application.

In addition, the Appellants submit that the Examiner is apparently applying an improper standard for written description. The claims contain an operability element by virtue of reciting "a method of fabricating an array of multiple features of different chemical moieties on a substrate surface". Therefore, inoperative embodiments that cannot be used to practice this method are not included within the scope of the claim. *Union Carbide Chemicals & Plastics Tech. Corp v. Shell Oil Co.*, 308 F.3d 1167, 1186 (Fed. Cir. 2002). Inoperative embodiments not included in the claims need not be described, as the Examiner appears to be requiring. According to 35 U.S.C. § 112, first paragraph, the specification shall contain a written description of *the invention*. Therefore, Appellants are not required to describe (or enable) that which is not their invention.

Moreover, the Court has held that it is not a function of the claims to specifically exclude possible inoperative embodiments. *Atlas Powder Co. v. E.I. DuPont de Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984). A claim may contain operative embodiments and inoperative embodiments. *Id.* There is no requirement that every embodiment be an operative embodiment. *Id.* Only if the number of inoperative embodiments becomes significant, and in effect forces one of ordinary skill in the art to perform undue experimentation in order to practice the claimed invention, might the claims be invalid. *Id.* at 1576-77.

The description of Appellants' invention in the specification and the elements of Appellants' claims themselves provide sufficient guidance to exclude many inoperative embodiments. With respect to the substrates, Appellants have disclosed a list of suitable substrate materials after the sentence (in the paragraph beginning at page 21, line 20) that was cited by the Examiner. Materials that cannot form substrates or those that cannot be used to make substrates with the directional and height uniformity elements of Appellants' claims are known to a person skilled in the materials art. In addition, such materials are excluded from the claims because the claims require that such a substrate exists. Thus, many (if not all) of the embodiments that the Examiner maintains are not described would be excluded

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from the claims.

Reversal of this rejection is respectfully requested.

B. "The methods encompass substrates that do not possess a first direction that has 'substantially' higher height uniformity than a second direction."

The Examiner asserts that the rejected claims encompass substrates that do not possess a first direction that has "substantially" higher height uniformity than a second direction. (See April 19, 2007 Advisory Action, page 3). This rejection is based on the Examiner's belief that "the current claim language does not limit the number of substrates because every material possesses two directions that differ in height uniformity (at least to some extent)." (See April 19, 2007 Advisory Action, page 3).

With respect to Claims 28 and 45, these claims are directed to a method that includes comparing height uniformity in a first direction and a second direction across a planar surface of a substrate to identify a first direction having higher substrate height uniformity than a second direction. The Examiner appears to be asserting that because a planar substrate may have a "random topology" the substrate "would not be amendable to the current process (even though it falls within the scope of the claims) because it would not lead to the deposition of materials in a direction with a 'substantially' higher substrate height uniformity (i.e., would not produce a useful result)." (See April 19, 2007 Advisory Action, page 5).

The Appellants' specification teaches that height uniformity of a substrate surface refers to the variation in relative height of the surface moving across the surface in a predetermined direction. These variations need not be "substantial" to produce a useful result. Even if the variations in relative height of the surface are small, the Appellants contend that one of skill in the art would realize that deposition of different chemical moieties in rows along the direction having the higher height uniformity would still produce a "useful result." Therefore, the Appellants contend that given the knowledge of one of skill in the art, and in view of the teachings of the specification (see page 5, lines 9-13), one of skill in the art would not doubt that the Appellants had possession of the claimed invention at the time of filing the

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application.

With respect to Claims 37 and 38, these claims are drawn to a method that includes receiving from a remote location both (a) a substrate and (b) an identification of a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate. For the reasons discussed above, the Appellants contend that one of skill in the art would comprehend that the variations in relative height of the surface need not be "substantial" to produce a useful result.

However, even if such were not the case, the elements of the claims do not depend on whether the substrate actually has a "substantially" higher height uniformity along a first direction than along a second direction, so long as an identification of a higher height uniformity, as recited in step (b), is received from the remote location. Hence, all that Claims 37 and 38 basically require is the receipt of the substrate, receipt of the identification and the placement of chemical moieties on the substrate. The Appellants contend that one of skill in the art would understand this and would know how to receive a substrate and the requisite identification from a remote location and, thus, would know how to fabricate an array in accordance with the teachings in the specification. Hence, one of skill in the art would not doubt that the Appellants had possession of the claimed invention.

Reversal of this rejection is respectfully requested.

C. "[The] claims encompass many substrates that cannot be 'drawn' into shapes that possesses [sic] 'substantially' higher height uniformity because these materials are either too brittle or would react with other materials at the melting temperature required for fabrication."

The Examiner asserts that the rejected claims encompass substrates that that cannot be "drawn" into shapes that possess "substantially" higher height uniformity because these materials are either too brittle or would react with other materials at the melting temperature required for fabrication. (See April 19, 2007 Advisory Action, page 5).

As discussed above, the description of Appellants' invention in the

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specification and the elements of Appellants' claims themselves provide sufficient guidance to exclude many inoperative embodiments. Appellants have disclosed a list of suitable substrate materials. (See page 21, lines 16-26). Because the claims recite a substrate that is drawn, the Appellants contend that one of skill in the art would readily understand that substrates that are not drawn (e.g. are too brittle to be drawn or would react with other materials at the melting temperature required for fabrication) are excluded from the metes and bounds of the claims. Therefore, contrary to the assertions of the Examiner, the rejected claims do not encompass substrates that cannot be drawn, and the Appellants contend that one of skill in the art would understand this and not doubt that the Appellants had possession of the claimed invention at the time of filing the application.

In addition, for the reasons discussed above, the Appellants contend that one of skill in the art would comprehend that the variations in relative height of the surface need not be "substantial" to produce a useful result. (See page 5, lines 9-13).

Further, with respect to Claims 37 and 38, as described above, all that matters is the receipt of a substrate and receipt of an *identification* of a higher height uniformity along a first direction than along a second direction of the substrate. The specification clearly teaches the requisite receipt and identification as recited in Claims 37 and 38. (See e.g. page 17, line 3 to page 20, line 10).

In view of the above, the Appellants contend that one of skill in the art would not doubt that the Appellants had possession of the claimed invention.

Reversal of this rejection is respectfully requested.

D. "[T]he claims encompass 'spherical' substrates that possess tangential planar surfaces that would not foster a comparison of height uniformity because there is only one point at which a plane touches a sphere (i.e., the tangential plane)."

The Examiner appears to be asserting that the Appellants claims encompass spherical substrates that possess "tangential" planar surfaces. (See April 19, 2007 Advisory Action, page 5).

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The Examiner appears to be reading into the claims elements described in the specification but not recited in the language of the claims. While it is true the specification describes a wide variety of materials that may perform the function of a substrate, the claims limit those possible materials by requiring that the substrate contain a planar surface (i.e., Claims 28 and 45). Hence, because the claims recite a substrate that has a planar surface, the Appellants contend that one of skill in the art would readily understand that substrates that do not have a planar surface (e.g. spherical substrates) are excluded from the metes and bounds of the claims. Hence, this assertion by the Examiner is erroneous. Because the claims specifically exclude substrates that do not possess a planar surface (e.g. Claims 28 and 45), the rejected claims do not encompass spherical substrates that possess "tangential" planar surfaces. Further, with respect to Claims 37 and 38, as described above, all that matters is the receipt of a substrate and receipt of an *identification* of a higher height uniformity along a first direction than along a second direction of the substrate. The specification clearly teaches the requisite receipt and identification as recited in Claims 37 and 38. (See e.g. page 17, line 3 to page 20, line 10).

In view of the above, the Appellants contend that one of skill in the art would not doubt that the Appellants had possession of the claimed invention.

Reversal of this rejection is respectfully requested.

E. "[N]o structural limitations are placed on the 'chemical moieties' that are used to form the array."

The Examiner asserts that the Appellants have set forth no structural limitations on the "chemical moieties" that are used to form the array. (See April 19, 2007 Advisory Action, page 5). Essentially, the Examiner appears to be arguing that without reciting the precise chemical moieties that may be used in conjunction with the claimed methods one of skill in the art would doubt that the Appellants had possession of the claimed invention. However, the Appellants have not claimed all chemical moieties, rather, only those that are capable of being deposited via the use of an inkjet printer. Additionally, the ability to identify on a substrate surface a higher substrate height uniformity does not depend on what type of chemical moiety is

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being used in the fabrication of the array. The use of ink-jet printing in the fabrication of arrays is well known and widely practiced in the art. Specifically, methods of depositing chemical moieties are taught throughout the specification. (See e.g. page 12, line 1 to page 14, line 13). In view of this, the Appellants contend that one of skill in the art would not doubt that the Appellants had possession of the claimed invention.

In view of the above, the Appellants contend that the assertions by the Examiner are erroneous and that one of skill would not doubt that the Appellants had possession of the claimed invention. Consequently, the Appellants respectfully request that the 35 U.S.C. § 112, first paragraph, rejection of Claims 28, 29, 31, 35, and 37-45 be withdrawn.

**II. Claims 28, 29, 31, 35, and 37-45 stand rejected under 35 U.S.C. § 112, first paragraph as not satisfying the enablement requirement.**

Claims 28, 29, 31, 35, and 37-45 were rejected under 35 U.S.C. § 112, first paragraph, for allegedly not being enabled for methods that lead to the production of *any* chemical moiety on *any* substrate surface. Rather, the Examiner asserts that the claims are enabled for forming an array of oligonucleotides on a rectangular substrate of drawn glass.

According to the M.P.E.P. § 2164.01 an analysis of whether a particular claim is supported by the disclosure in an application requires a determination of whether that disclosure, when filed, contained sufficient information regarding the subject matter of the claims so as to enable one skilled in the pertinent art to make and use the claimed invention. The test of enablement is whether one reasonably skilled in the art could make and use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.

The Examiner asserts that the rejected claims are not enabled for several reasons. The Examiner asserts that the claims encompass virtually an infinite number of substrates.

However, inoperative embodiments that cannot be used to practice this



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method are not included within the scope of the claim. *Union Carbide Chemicals & Plastics Tech. Corp v. Shell Oil Co.*, 308 F.3d 1167, 1186 (Fed. Cir. 2002). In addition, the Federal Circuit has held that it is not a function of the claims to specifically exclude possible inoperative embodiments. *Atlas Powder Co. v. E.I. DuPont de Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984). A claim may contain operative embodiments and inoperative embodiments. *Id.* There is no requirement that every embodiment be an operative embodiment. *Id.* Only when the number of inoperative embodiments becomes significant, so as to require undue experimentation by the routineer to determine operative embodiments, does the issue of lack of enablement come into play. *Id.* at 1576-77.

As pointed out above, the claims contain an operability element by virtue of reciting a method of fabricating an array of multiple features of different chemical moieties on a substrate surface. As previously discussed, the Appellants contend that the claims specifically exclude all substrates that do not possess a planar surface, those that cannot be drawn, and those that are not identified as having a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction. Accordingly, the claims exclude various embodiments of substrates that are outside the metes and bounds of the claim elements.

The Examiner further asserts that the state of the art and level of predictability is low. The claims are drawn to methods of fabricating arrays of different chemical moieties on the surface of a substrate. The Appellants contend that the general technology of array fabrication has been known for years. In fact, as evidenced by Agilent, whole industries have grown around this type of technology. For instance, academic institutions all over the nation such as Stanford and Harvard regularly employ these technologies in biological research. Hence, contrary to the assertion of the Examiner, the Appellants contend that the state of the art and level of predictability in the array fabrication arts is relatively high.

Further still, the Examiner asserts that the quantity of experimentation need to make and use the invention is great. However, the specification teaches how to determine surface height variations so as to generate a height uniformity (See page 4, lines 6-9 and page 7, line 30 to page 8, line 8). The specification also teaches

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exemplary substrates which may be used in accordance with the methods of the invention (See page 9, lines 3-17). Further still, the specification teaches how to use an inkjet printer to deposit a chemical moiety on the surface of the substrate in accordance with the elements of the claimed invention (See page 11, line 27 to page 20, line 29). Thus, undue experimentation is not required to make and use the invention.

Therefore, in view of the knowledge of one of skill in the art and in light of the Appellants' extensive teachings regarding the claimed methods, there is no reason to believe that one of skill in the art could not practice the claimed invention without undue experimentation.

Consequently, the Appellants respectfully request that the 35 U.S.C. § 112, first paragraph, rejection of Claims 28, 29, 31, 35, and 37-45 be withdrawn.

**III. Claim 45 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Cremer.**

The Examiner asserts that Cremer discloses the use of square well plates having dimensions of 25  $\mu\text{m}$  x 25  $\mu\text{m}$  to 250  $\mu\text{m}$  x 250  $\mu\text{m}$  and having hydrophobic partitions ranging from 25  $\mu\text{m}$  to 250  $\mu\text{m}$ . (See Cremer, page 8131, column 2). The Examiner equates this disclosure with the Appellants' claimed comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity.

According to the M.P.E.P. § 2131, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Additionally, the identical invention must be shown in as complete detail as is contained in the claim. (See M.P.E.P. § 2131).

Claim 45 is directed to a method of fabricating an array of multiple features of different chemical moieties on a surface of a substrate. The method includes comparing height uniformity in a first direction and a second direction across a planar surface of the substrate to identify a first direction having higher substrate

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height uniformity than a second direction, wherein the first and second directions are planar to the substrate. The method further includes placing the different chemical moieties in a row on the planar surface of the substrate lengthwise along the direction having the higher height uniformity so as to provide a row of different chemical moieties that is more closely aligned with the first direction than the second direction, wherein the row contains a plurality of spatially addressable features containing the different chemical moieties, so as to fabricate the array of multiple features of different chemical moieties on the substrate surface.

An element of the rejected claims is comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity. The Appellants' specification defines a "height uniformity" as the "variation in relative height of the surface moving across the surface in a predetermined direction." (See page 7, lines 30-31).

Although Cremer may have measured the dimensions of the square well plates and determined the depth of the hydrophobic partitions, Cremer has not determined the variations in the relative height across the surface of the substrate nor has Cremer used that determination to compare height uniformity so as to identify the direction having the higher uniformity so as to place chemical moieties on the surface in a row along the direction having the higher uniformity. Specifically, there is no teaching within Cremer with regard to the variation of substrate surface height or placing chemical moieties on the surface of a substrate based on a comparison of uniformity height. Rather, Cremer discloses using photolithographic techniques for forming wells on a substrate and placing lipids within those wells by use of a capillary tube. Hence, Cremer discloses a completely different method for fabricating an array than that claimed by the Appellants.

In view of the above, Cremer is deficient in that it fails to teach all the elements of the rejected claims. Namely, Cremer fails to teach comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity. Therefore, Cremer fails to teach all the elements of the rejected claims it fails to anticipate the claimed

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invention.

Consequently, the Appellants respectfully request that the 35 U.S.C. § 102(b) rejection of Claim 45 be withdrawn.

**IV. Claims 28 and 45 stand rejected under 35 U.S.C. § 103(a) as being obvious over Cremer in view of Lemmo and Baldeschwieler.**

As to Claim 45, the Examiner alleges that because Cremer anticipates the claim, it renders the claim obvious as a result.

According to the M.P.E.P. § 706.02(j), to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

As set forth above, an element of the rejected claims is comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity. As described above, Cremer is deficient in that it does not teach these elements. Cremer does not teach or suggest these elements because Cremer merely discloses the dimensions of the square well plates used and the depth of the wells partitioned in the chip. Further, to the extent that Cremer discloses placing a lipid on to the substrate it is by positioning a capillary tube above the substrate and delivering the lipid on to the substrate. There is no teaching or suggestion that this delivery is in the direction having the higher height uniformity. Therefore, a *prima facie* case of obviousness for Claim 45 has not been established because the recited combination fails to teach or suggest all the elements of the rejected claims.

As to Claim 28, the Examiner alleges that Cremer substantially discloses the claimed invention, but is deficient in that Cremer does not disclose the use of a pulse jet printer to deposit the different chemical moieties. Thus, to remedy these

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deficiencies, the Examiner relies upon Lemmo and Baldeschwieler to remedy these deficiencies.

As discussed above, Cremer is deficient in that it fails to disclose comparing height uniformity in two directions of a substrate surface to identify a direction on the surface having a higher uniformity and then placing chemical moieties on the surface in a row in the direction having the higher height uniformity. As Lemmo and Baldeschwieler were cited solely for their disclosure of the use of a pulse jet printer, they fail to remedy the deficiencies of Cremer.

In view of the above, the Appellants contend that a *prima facie* case of obviousness has not been established because the cited combination fails to teach or suggest all the elements of the rejected claims. Consequently, the Appellants respectfully request that the 35 U.S.C. § 103(a) rejection of Claims 28 and 45 be withdrawn.

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**SUMMARY**

- I. Claims 28, 29, 31, 35 and 37-45 satisfy the written description requirement under 35 U.S.C. § 112, first paragraph because a person of skill in the art would not doubt that the Applicants had possession of the claimed invention at the time of filing the application.
- II. Claims 28, 29, 31, 35 and 37-45 satisfy the enablement requirement under 35 U.S.C. § 112, first paragraph because a person of skill in the art could make and use the claimed invention without undue experimentation.
- III. Claim 45 are not anticipated by Cremer et al. under 35 U.S.C. § 102(b) because Cremer fails to teach each and every element of the rejected claim.
- IV. Claims 28 and 45 are not obvious under 35 U.S.C. § 103(a) over Cremer et al. in view of Lemmo et al. and Baldeschwieler et al. because the cited combination fails to teach or suggest every element of the pending claims.

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**Relief Requested**

The Appellants respectfully request that all rejection of Claims 28, 29, 31, 35 and 37-45 be reversed and that the application be remanded to the Examiner with instructions to issue a Notice of Allowance.

Respectfully submitted,

Date: June 15, 2007

By: 

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**CLAIMS APPENDIX**

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1. – 27. (Cancelled)

28. (Previously Presented) A method of fabricating an array of multiple features of different chemical moieties on a surface of a substrate, comprising:

- (a) comparing height uniformity in a first direction and a second direction across a planar surface of a substrate to identify a first direction having higher substrate height uniformity than a second direction, wherein said first and second directions are planar to said substrate; and
- (b) employing a pulse jet printer to deposit different chemical moieties in rows on said planar surface of the substrate lengthwise along the direction having the higher height uniformity, wherein said rows each contain a plurality of spatially addressable features containing said different chemical moieties and wherein said rows are more closely aligned with the first direction than the second direction,

in order to fabricate an array of multiple features of different chemical moieties on a substrate surface.

29. (Previously Presented) A method of fabricating an array of multiple features of different chemical moieties on a substrate surface, comprising:

- (a) receiving the substrate from a remote location;
- (b) receiving from a remote location an identification that indicates the direction in which the substrate was drawn; and
- (c) placing the different chemical moieties on the substrate so as to provide features thereon along rows aligned with said direction,

in order to fabricate an array of multiple features of different chemical moieties on a substrate surface.

30. (Cancelled)

31. (Previously Presented) The method according to claim 29, wherein the rows



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are parallel to the direction in which the substrate was drawn.

32. – 34. (Cancelled)

35. (Previously Presented) A method of claim 29, wherein said identification comprises reference to a shape characteristic of the substrate or housing thereof.

36. (Cancelled)

37. (Previously Presented) A method of fabricating an array of multiple features of different chemical moieties on a substrate surface, comprising:

- (a) receiving the substrate from a remote location;
- (b) receiving from a remote location, an identification of a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate, wherein said first and second directions are planar to said substrate;
- (c) placing the different chemical moieties in rows on the substrate, wherein said rows each contain a plurality of different chemical moieties and wherein said rows are more closely aligned with the first direction than the second direction,

in order to fabricate an array of multiple features of different chemical moieties on a substrate surface;

wherein said identification is communicated from said remote location via electronic media.

38. (Previously Presented) A method of fabricating an array of multiple features of different chemical moieties on a substrate surface, comprising:

- (a) receiving the substrate from a remote location;
- (b) receiving from a remote location, an identification of a first direction across the substrate surface along which the substrate surface has a higher height uniformity than along a second direction across the substrate, wherein said first and second directions are planar to said substrate;

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(c) placing the different chemical moieties in rows on the substrate, wherein said rows each contain a plurality of different chemical moieties and wherein said rows are more closely aligned with the first direction than the second direction,

in order to fabricate an array of multiple features of different chemical moieties on a substrate surface;

wherein said identification is communicated from a computer memory, in response to providing an identifier of the substrate.

39. (Previously Presented) The method of claim 29, wherein said identification is associated with the substrate or packaging thereof.

40. (Previously Presented) The method of claim 29, wherein said identification references a shape characteristic of the substrate or housing thereof.

41. (Previously Presented) The method of claim 29, wherein said identification is associated with the substrate via an identifier on said substrate, or housing thereof.

42. (Previously Presented) The method of claim 29, wherein said identification is communicated from said remote location.

43. (Previously Presented) The method of claim 42, wherein said identification is communicated via electronic media.

44. (Previously Presented) The method of claim 42, wherein said identification is communicated from a computer memory, in response to providing an identifier of the substrate.

45. (Previously Presented) A method of fabricating an array of multiple features of different chemical moieties on a surface of a substrate, comprising:

(a) comparing height uniformity in a first direction and a second direction across a planar surface of a substrate to identify a first direction having higher

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substrate height uniformity than a second direction, wherein said first and second directions are planar to said substrate; and

(b) placing the different chemical moieties in a row on said planar surface of the substrate lengthwise along the direction having the higher height uniformity so as to provide a row of different chemical moieties that is more closely aligned with the first direction than the second direction, wherein said row contains a plurality of spatially addressable features containing said different chemical moieties,

in order to fabricate an array of multiple features of different chemical moieties on a substrate surface.

46. (Cancelled)

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**Evidence Appendix**

No evidence that qualifies under this heading has been submitted during the prosecution of this application, and as such it is left blank.

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**Related Proceedings Appendix**

As stated in the *Related Appeals and Interferences* section above, there are no other appeals or interferences known to Appellants, the undersigned Appellants' representative, or the assignee to whom the inventors assigned their rights in the instant case, which would directly affect or be directly affected by, or have a bearing on the Board's decision in the instant appeal. As such this section is left blank.